

REMARKS

This paper is filed in response to the final official action dated May 17, 2010 (hereafter, the “official action”). This paper is timely filed as it is accompanied by a petition for extension of time and authorization to charge our credit card in the amount of the requisite fee. The Director is hereby authorized to charge any deficiency in the fees filed, asserted to be filed, or which should have been filed herewith, to our Deposit Account No. 13-2855, under Order No. 29610/CDT337.

As an initial matter, the applicants acknowledge with appreciation the interview with Examiner Bowman on August 30, 2010, during which claims substantially corresponding to the claims presented herein and the cited art were discussed. The Examiner (preliminarily) agreed that the amended claims were patentable over the cited art for reasons presented herein.

All pending claims 1-16 currently stand rejected. By the foregoing, claims 1, 5, 7-11, and 13 have been amended, and claims 2-4 have been canceled without prejudice or disclaimer. Support for the amendments to claim 1 may be found, for example, in original claims 2-4. Support for the amendment to claim 12 may be found, for example, in original claim 2. The other amendments merely relate to matters of form. No new matter has been added.

Claims 1-3, 6-12, 15, and 16 stand rejected as assertedly obvious over U.S. Patent Publication No. 2003/0234609 A1 to Aziz et al (“Aziz”) in view of International (PCT) Patent Publication No. WO 2004/004421 A2 to Bechtel et al. (“Bechtel”). Claims 4 and 5 stand rejected as assertedly obvious over Aziz and Bechtel in further view of U.S. Patent Publication No. 2003/012797 to Hofstra et al. (“Hofstra”). Claims 13 and 14 stand rejected as assertedly obvious over Aziz in view of Hofstra.

CLAIM REJECTIONS -- 35 U.S.C. §103(a)

Claims 1-3, 6-12, 15, and 16 stand rejected as assertedly obvious over Aziz in view of Bechtel. Claims 4 and 5 stand rejected as assertedly obvious over Aziz and Bechtel in further view of Hofstra. Claims 13 and 14 stand rejected as assertedly obvious over Aziz in view of Hofstra. The applicants respectfully traverse the rejections.

Claims 1, 5-12, 15, and 16 are directed to an OLED comprising a substrate bearing a light emitting layer between an electrically conducting anode and an electrically conducting

cathode, the diode being configured for light emission through said cathode, the cathode being transmissive at a light emission wavelength of the diode, the cathode comprising (i) an electron injecting layer for injecting electrons into said light emitting layer, (ii) an optical interference structure, and (iii) an electrically conducting layer, said electron injecting layer being closest to the light emitting layer and said optical interference structure being disposed between said electron injecting and electrically conducting layers, wherein said optical interference structure is configured to enhance light transmission through said cathode at said emission wavelength and comprises an optical interference layer disposed between first and third layers of different refractive indices such that reflections from front and back surfaces of said optical interference layer interfere to enhance light transmission through said cathode at said emission wavelength, said first layer comprising the electron injecting layer for injecting electrons into said light emitting layer, said third layer comprising the electrically conducting layer, and said optical interference layer having an optical thickness of between a third of said emission wavelength and a fifth of said emission wavelength.

Aziz discloses a display device composed of a cathode, an anode, and a luminescent region between the cathode and the anode. The cathode can comprise a metal-organic mixed layer (MOML). The cathode can further comprise a capping region to protect the MOML from ambient conditions (see paragraph 0207). Similarly, the cathode can further comprise a separate electron injecting region to facilitate electron injection from the MOML (see paragraph 0208).

Aziz, however, does not disclose a cathode comprising an optical interference structure as claimed. In this respect, it appears the examiner proposes to equate the MOML layer(s) to the claimed optical interference structure. Specifically, it appears that the examiner considers the electrode embodiment disclosed in Aziz at paragraph 0225 and Figure 20, that includes a capping region, two distinct MOML layers, and an electrically conductive layer to correspond (in some sense) to the claimed subject matter. Aziz, however, is generally directed to decreasing light ambient reflection from a device (see, for example, paragraphs 0006 and 0104). Aziz fails to appreciate that incorporating an optical interference structure within a cathode as claimed can increase outcoupling from the device. As a result, Aziz fails to provide or suggest any motivation for varying the refractive indices and/or the relative thicknesses of the various layers disclosed therein to provide a cathode comprising an

optical interference structure as recited in the amended claims. For this reason, the examiner turned to Bechtel.

Bechtel discloses OLED-based display devices in which transparent dielectric layers 5, 6 are external to and layered upon transparent second electrode/cathode 4 (*see*, for example, Bechtel at page 4, lines 13-17 and Fig. 1). Bechtel, however, fails to teach anything that would lead a person of ordinary skill to believe the aforementioned transparent dielectric layers would work as disclosed therein if the dielectric layers were made to be internal to the device. Therefore, one of ordinary skill would not have had a reasonable expectation that the dielectric layers of Bechtel would function as disclosed in Bechtel if the layers were disposed within the cathode of Aziz.

Moreover, Bechtel teaches that the configuration in which the transparent dielectric layers are external to and layered upon the electrode/cathode is advantageous because “[t]he actual manufacturing process of the electroluminescent device remains unchanged because the transparent dielectric layers are provided only at the end of the process” (*see* Bechtel at p. 2, lines 23-25). Thus, Bechtel teaches away from and fails to suggest a cathode comprising an electron injecting layer for injecting electrons into said light emitting layer, an optical interference structure, and an electrically conducting layer, said electron injecting layer being closest to the light emitting layer and *said optical interference structure being disposed between said electron injecting and electrically conducting layers, as recited in all pending claims*¹ because, for example, incorporating such a cathode structure into the OLED disclosed by Bechtel would necessarily change the manufacturing process.

In view of (i) the absence of any recognition in Aziz that any of the layers disclosed therein can be constructed and arranged to function as an optical interference structure in a cathode as claimed, (ii) the failure of Bechtel to teach or suggest that the dielectric layers disclosed therein would work if made to be internal to the device disclosed therein, and (iii) the teaching away in Bechtel from incorporating the dielectric layers disclosed therein into a cathode (i.e., away from a cathode having an internal optical interference structure disposed between electron injecting and electrically conducting layers as claimed), one of ordinary

¹ The applicants note that the examiner characterized applicants’ previous argument regarding teaching away as “Bechtel teaches away from the structure set forth in Aziz” (see page 2 of the outstanding official action). The applicants respectfully submit, however, that the argument is more accurately characterized as Bechtel teaches away from the claimed invention.

skill would not be motivated to combine these documents as proposed. Thus, the rejections of claims 1-12, 15, and 16 should be removed.

With respect to claims 13 and 14, Aziz also fails to disclose or suggest an OLED-based display device including one or more OLEDs having a first electrode layer comprising a spacer layer sandwiched between a coupling layer for connecting to an OLED material and a third, substantially electrically conductive layer, said coupling layer and said substantially electrically conductive layer having different refractive indices such that reflections from front and back surfaces of said spacer layer interfere to enhance light transmission through said cathode at said emission wavelength and wherein said spacer layer has a thickness of approximately an odd integral number of quarter wavelengths at said peak electroluminescence wavelength such that transmission through said first electrode layer at said peak electroluminescence wavelength is substantially maximized.

As mentioned above, Aziz fails to disclose increasing outcoupling from the device. As a result, Aziz fails to provide or suggest any motivation for varying the relative thicknesses of the various layers disclosed therein to provide a first electrode layer as claimed.

Hofstra teaches a device which emits through the anode, and fails to teach a multi-layered anode. Any optical interference structures disclosed in Hofstra are external to the electrodes. In view of the absence of any recognition in Aziz that any of the layers disclosed therein can be constructed and arranged to provide a first electrode layer as claimed, and the failure of Hofstra to disclose any structure which could accommodate such a spacer layer, one of ordinary skill would not be motivated by the teachings of Hofstra to form an electrode layer, as recited in claims 13 and 14.

In view of the above comments, the applicants respectfully submit that a *prima facie* case of obviousness cannot be sustained.

CONCLUSION

It is submitted that the application is in condition for allowance. Should the examiner wish to discuss the foregoing, or any matter of form or procedure in an effort to advance this application to allowance, she is respectfully invited to contact the undersigned attorney at the indicated telephone number.

Respectfully submitted,

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